April 18, 2007

SANTEE COOPER SUPPLEMENTAL SUBMISSION ON TECHNOLOGY ALTERNATIVES TO AND BACT ANALYSIS FOR THE PROPOSED PEE DEE FACILITY

Santee Cooper is proposing to construct two supercritical pulverized coal (SCPC) units at the proposed Pee Dee Generation Stations near Kingsburg, South Carolina. Each of the Pee Dee units will produce a nominal 660 MW and operate with the most advanced pollution control technologies for limiting its emissions of regulated air pollutants at such coal-fired units. Notably, Santee Cooper has considered a variety of energy resources as alternatives to building two 660 MW SCPC units that burn eastern bituminous coal. One alternative specifically considered, but rejected, was integrated gasification combined cycle (IGCC). A technical justification in support of this decision was provided in an "alternative analysis" contained in the Pee Dee permit application that was submitted in May 2006. That alternative analysis explains Santee Cooper's rationale for eliminating IGCC technology, circulating fluidized bed (CFB) boilers and various other alternative energy resources for meeting its future baseload energy demand. Further explanation and technical support for Santee Cooper's decision to employ SCPC, instead of IGCC or other technology, is provided below in Section I of this paper. This additional information for the alternative analysis is intended to further demonstrate that Santee Cooper has given careful consideration to IGCC and other alternatives as required by section 165(a)(2) of the Clean Air Act (CAA or Act) and address the concerns raised in the comments filed by the Southern Environmental Law Center (SELC) on the Pee Dee project.[1]

Even without this supplemental submission, the Pee Dee permit meets all of the requirements of the Act. The Pee Dee permit application contains a detailed technical review for selecting "best available control technology" (BACT) pursuant to section 165(a)(4) of the Act. Santee Cooper's BACT analysis evaluated all available emissions control technologies for air pollutants currently regulated by federal law. Section II of this paper supplies a detailed explanation as to why it is premature for Santee Cooper to conduct BACT analyses for air emissions from the project that are not yet regulated by the CAA, *e.g.*, carbon dioxide (CO_2) and other greenhouse gases. For each regulated air pollutant, Santee Cooper performed a detailed evaluation of the control technologies available and selected the use of the most advanced pollution control technologies on two SCPC units. In so doing, Santee Cooper eliminated IGCC as a reference control technology for setting BACT emissions standards under several steps of the "top-down" BACT analysis. Section III of this paper provides additional support for the elimination of IGCC as a demonstrated, commercially available and cost-effective control technology under steps 1, 2 and 4 of the top-down BACT analysis.

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[1] *See* Letter from Southern Environmental Law Center to SCDHEC, dated March 15, 2007 (hereinafter referred to as "SELC Comments") on Santee Cooper's Prevention of Significant Deterioration Permit Application for Pee Dee Units.

Although the main focus of this submission is on the BACT issues raised in the SELC comments, Santee Cooper takes strong exception to SELC's unsubstantiated assertions that emissions from the new Pee Dee plant "will degrade air quality in South Carolina."[2] As DHEC is well aware, no PSD permit to construct the new plant will be issued until Santee Cooper has fully demonstrated that the new plant's emissions will –

- Not cause or contribute to a violation of any national ambient air quality standard (NAAQS), PSD Class II Increment, or any applicable South Carolina standards (*i.e.*, DHEC Standards 2 and 7), and
- Not have an adverse impact on visibility and other air quality related values in nearby Class I areas, such as the Cape Romain National Wildlife Refuge.

To that end, Santee Cooper has worked closely with DHEC and the Federal Land Manager (FLM) to develop the best modeling protocols for evaluating the air quality impacts from the new plant in accordance with EPA-approved models and methodologies. Volume II of the PSD permit application provides a detailed discussion of the methods and models, which are consistent with EPA's Guideline on Air Quality Models as well as with the requirements of DHEC and the FLM. Santee Cooper believes, as demonstrated in the most recent modeling submitted to DHEC – in consultation with EPA, DHEC and the FLM – that emissions will meet the strict CAA permitting requirements of "preventing significant deterioration of air quality."

I. The Proposed New Baseload Coal-Fired Generation is Necessary and the Best Alternative for Meeting Santee Cooper's Future Energy Demand.

Section 165(a)(2) of the CAA requires the permitting authority to hold "a public hearing" and provide "opportunity for interested persons … to appear and submit written or oral presentations on the air quality impacts of such source, *alternatives thereto*, control technology requirements, and other appropriate considerations."[3] DHEC's obligations under section 165(a)(2) of the Act are well defined and limited in scope. As explained in a recent PSD permitting decision of the Environmental Appeals Board (EAB), the permitting authority does not have an affirmative obligation to "conduct an independent analysis of available alternatives" and is only required to respond to comments on alternatives raised during the public comment period that are related to the air quality impacts of the proposed project.[4]

Contrary to the assertions in the SELC comments, Santee Cooper has conducted a thorough and detailed evaluation of all possible alternatives for meeting the future energy needs of South Carolina. Our evaluation included developing projections on the amount of new baseload generation needed over the next decade, as well as a detailed analysis of the energy resource options for meeting that need. In so doing, Santee Cooper gave extensive consideration to a wide variety of energy resources and generating technologies that could provide approximately 1300 MW of new baseload generation to meet

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[2] SELC Comments at page 1.
[3] 42 U.S.C. § 7475(a)(2) (emphasis added).
[4] *In re: Prairie State Generating Company*, PSD Appeal No. 05-05, slip op. at 38-40 (EAB Aug. 24, 2006).

forecasted new demand. In addition to SCPC, we evaluated natural gas combined cycle, traditional gas or oil-fired steam boilers, nuclear power, conventional (sub-critical) pulverized coal, IGCC, and circulating fluidized bed boilers. Other alternatives, such as simple-cycle gas turbines, renewable energy (solar, wind, biomass, *etc.*) and energy efficiency/conservation projects also were considered, but were determined to be impractical for adding about 1300 MW of reliable, low-cost baseload generation.

This paper briefly reviews the alternative generation technologies and energy sources that Santee Cooper considered, and summarizes the evaluation performed in selecting the SCPC generating technology burning eastern bituminous coal for the proposed Pee Dee Generating Station. Among other things, Santee Cooper believes that this information provides a comprehensive response to the mischaracterizations and concerns that SELC has raised regarding the selection of the proposed Pee Dee Station as the best alternative for meeting the forecasted baseload energy demand.

A. Santee Cooper Has a Strong Need for New Baseload Generating Capacity in order to Meet the State's Growing Electric Demand.

Santee Cooper provides power to more than two million people in South Carolina. This includes direct retail electric service to 150,000 residential and commercial customers in Berkley, Georgetown, and Horry counties, as well as 31 large industrial facilities. In addition, Santee Cooper is the primary source of power to the State's 20 electric cooperatives (serving 665,000 customers located in all of the State's 46 counties), the cities of Bamberg and Georgetown, and the Charleston Air Force Base. To ensure an adequate supply of affordable and reliable power for all of these customers, Santee Cooper regularly develops and updates a comprehensive energy resource plan, which provides a long-term road map for building baseload electrical generation needed for its customers. The first step of this planning process is to develop detailed forecasts of near- and long-term energy and demand requirements for each category of customers based on the best available forecasting and data analysis. The resulting load forecasts are compared to Santee Cooper's existing and planned reserve margins to determine the quantity and timing of generation shortfalls.

These energy forecasts clearly indicate the need for the proposed 1330 MW of new baseload electric generation within the next ten years to accommodate the State's current and projected growth. Notably, Santee Cooper's available generating capacity will fall short of its projected total load requirements by about 2010 despite having brought online about 1200 MW of new generating capacity at the Cross Generating Station.[5] The reason for Santee Cooper's shortfalls in generation is the continued strong rate of growth within the State. Current forecasts indicate that South Carolina's population is increasing about 3 to 4% annually, and the State is expected to have 5 million residents by 2025. Santee Cooper's growth rate for energy demand in its direct

[5] Cross Unit 3 began full commercial operation in January 2007 and Cross Unit 4 is scheduled to begin commercial operation by January 2009.

service area has averaged 3 % over the past five years. All economic indicators confirm that these trends will continue, if not increase, over the foreseeable future.

To meet the future energy needs of its customers, Santee Cooper must now begin to prepare bringing online additional new baseload generation over the next decade. Specifically, 660 MW of new baseload generation is need by 2011 to 2012, and another 660 MW of new baseload generation is needed by 2014 or 2015. As discussed below, this new baseload generation is needed despite Santee Cooper's ambitious programs for conserving energy and developing new renewable energy resources throughout South Carolina. Energy conservation is an important component of our planning because conservation helps reduce energy demand, saves money and protects the environment. Conserving energy lowers customers' power bills and decreases the demands placed on the company's generating facilities. Similarly, renewable energy is an important part of the company's fuel mix portfolio, which includes 21.6 MW of landfill generation by 2010 as well as plans for developing a strong mix of solar, wind, and biomass projects across South Carolina. Santee Cooper considered these alternatives, but determined that these renewable energy resources would be impractical for adding 1320 MW of new reliable, load-cost baseload generation by approximately 2015.

B. Eastern Bituminous Coal Is the Best Energy Source for Santee Cooper's New Baseload Generation over the Next Ten Years.

Santee Cooper evaluated a wide and diverse set of potential energy resources for meeting the forecasted additional new baseload generating capacity that Santee Cooper needs over the next ten years. This evaluation included a careful examination of coal, natural gas, distillate oil, nuclear, renewable energy and conservation. Based on best available data on fuel supply, cost, and other relevant factors, Santee Cooper selected new clean coal generation with eastern bituminous coal as the design fuel.

Natural gas and oil prices have become increasingly volatile and, based on recent government projections, will most likely remain as much as 2-3 times the equivalent cost of coal on a $/MMBtu basis for the foreseeable future. Natural gas and distillate oil therefore do not represent a cost-effective economic alternative for the baseload generation in significant amounts. In addition, the use of natural gas is not a realistic option given that there is not an adequate supply of natural gas in the Pee Dee area to power one, let alone two, 660 MW electric generating units. Another important consideration is that oil and natural gas are increasingly dependent on foreign sources of supply that are vulnerable to interruption and price volatility.

In contrast, abundant supplies of bituminous coal exist east of the Mississippi River, with sources of eastern bituminous relatively near the proposed Pee Dee site. These design coals can be available for delivery by rail with minimal bottlenecks and delivery problems that are not uncommon for western subbituminous and some of the eastern low-sulfur bituminous coals. Since the new Pee Dee units must provide additional baseload power with a high capacity factor, dependable coal supply is essential. While new nuclear capacity is considered to represent a viable long-range

alternative for new baseload generation, it cannot be licensed and constructed within the timeframe needed for meeting near-term energy demands. For these reasons, Santee Cooper selected eastern bituminous coal as the primary fuel of choice for the required 1320 MW of baseload power generation installed with the most advanced pollution control technologies. Building and operating a highly efficient, low-emitting SCPC facility will provide low-cost electricity to Santee Cooper's customers, while providing maximum protection to the air quality and the environment.

Finally, consideration was given to energy efficiency and conservation as an alternative to building new coal-fired generation. Notably, Santee Cooper has underway many projects for promoting energy efficiency and conservation that lower consumer demand for electricity. The kilowatt hours avoided through these existing and future planned projects, however, will not be sufficient to offset substantial increases in electricity demand that are being projected for the Santee Cooper service area. Similarly, Santee Cooper has determined that renewable energy – including a strong mix of landfill, other biomass, and solar projects across South Carolina – fall way short of its projected new energy load requirements. For these reasons, Santee Cooper has concluded that the construction of 1320 MW of additional new baseload generation is essential in meeting our near-term forecasted energy and demand requirements. Even so, Santee Cooper promotes energy efficiency and conservation and use of renewable energy through Green Power programs with our customers to the maximum extent feasible, and these programs are an important component of our overall resource plan.

C. Santee Cooper Considered, But Eliminated, Less Efficient Sub-Critical Generating Technologies.

Santee Cooper examined, but did not select, conventional (sub-critical) pulverized coal-fired (PC) boilers and circulating fluidized bed (CFB) boilers.[6] Both boiler technologies represent designs that are technologically mature and have been demonstrated to be reliable for base-load utility service. In each case, air pollution control systems have evolved such that state-of-the-art air emission control levels can be achieved by each generating technology. Notable reasons for the elimination of each boiler technology alternative are provided below.

CFB boilers are significantly smaller than the design capacity achievable by SCPC boiler. The maximum commercially proven size of a CFB boiler is currently about 250-300 MW, while a SCPC boiler can be as large as 1200 MW. The selection of CFB technology for the Pee Dee facility would thus require Santee Cooper to construct four or five complete CFB boiler systems, instead two 660 MW SCPC boilers. Due to cost

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[6] The CFB technology utilizes the fluidized bed principle in which crushed fuel and limestone are injected into the furnace or combustor and suspended in a stream of upwardly flowing air at the bottom of the furnace, forming a suspension of hot fluidized material. Combustion occurs at approximately 1550°F-1650°F. The calcium in the limestone combines in the furnace with the oxidized sulfur from the fuel to form calcium sulfate, reducing emissions of SO_2. The comparatively low furnace temperatures minimize the formation of NO_x. Particles are carried out of the furnace with the flue gas, with fine particles collected by a particulate control device. Larger particles are collected by the solids separators, circulated back into the furnace and re-entrained into the fluidized bed, improving limestone utilization and removal efficiency.

efficiencies of constructing fewer larger units and associated material handling systems, Santee Cooper's proposal to build two SCPC units will have a capital cost that is significantly lower than an equivalent plant consisting of six CFB units.

Another important difference is the lower efficiency of both conventional PC and CFB boilers, as compared to SCPC technology. Currently, all CFB plants in operation are sub-critical units with significantly lower efficiencies than SCPC units.[7] As a result, a sub-critical CFB unit would require more fuel, with resulting increases in air emissions for the same electrical output. Importantly, supercritical technology allows the steam generation cycle to operate at an efficiency level (which is often expressed as "heat rate" in units of Btu/kWh) up to 10% greater than traditional sub-critical pressure units. Increased generation efficiency results in a savings to utility customers (since the same electricity output can be achieved with lower fuel usage with reduced air emissions on a per-kW-produced basis). Similarly, supercritical boilers emit less CAA-regulated air pollutants and CO_2 per kW of electricity produced than conventional sub-critical PC units. For these reasons, Santee Cooper's evaluation of alternative technologies eliminated sub-critical CFB and pulverized coal as candidates for the required 1,320 MW of new baseload generating technology.

D. IGCC Is an Immature Technology that Was Rejected as the Less Reliable and More Costly Alternative.

Santee Cooper carefully examined IGCC[8] as an alternative to SCPC technology for providing 1320 MW of new coal-fired generating capacity. Based on this examination, Santee Cooper eliminated IGCC as an immature generating technology that poses significant increased energy and cost risks for a small electric utility system and therefore would undermine Santee Cooper's ability to provide reliable and affordable electricity to its customers. As discussed below, SCPC is a fully mature technology that is vastly superior to IGCC, which is less reliable and more costly than SCPC, without providing any significant benefits in generating efficiency or environmental controls.

i. IGCC is an available but immature technology.

SCPC is a proven and reliable technology for power generation. There are approximately 160 SCPC generating units currently operating in the United States, with over 500 units operating worldwide. The utility industry has been commercially operating these SCPC units for many decades. In contrast, only four operating coal-

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[7] Reports indicate that a supercritical CFB plant in Poland is under development but there is no demonstrated experience to date with supercritical CFB plants.

[8] IGCC involves the gasification of coal (or other fuel) into a feedstock that is used to power a combustion turbine combined cycle power block. There are four primary processes in an IGCC power plant: (1) gasification of the fuel; (2) cleanup of the synthetic gas (syngas); (3) cryogenic air separation; and (4) gas turbine combined cycle power generation. An extensive gas cleanup train is required to remove pollutants from the syngas so that it can be combusted in a combined cycle combustion turbine. The combination of the air separation/syngas cleanup stages, multiple coal gasifiers, a combined cycle combustion turbine, heat recovery steam generator and steam turbine generator, all working together in a single complex, interdependent power block is referred to as an integrated gasification combined cycle, or IGCC system.

based IGCC facilities exist in the world today; these units have been in commercial operation for less than 15 years, with only 510 MW of IGCC capacity in operation in the United States. The four existing IGCC plants include Tampa Electric's Polk Power Station in Florida; SG Solutions' facility at Cinergy's Wabash River Generating Station in Indiana; Nuon's Willem-Alexander Centrale Station in the Netherlands; and the Elcogas Puertollano facility in Spain. All four of these facilities are single train gasification plants, each with a new output in the range of 250-265 MW. Similarly, all four of the IGCC facilities received significant amounts of co-funding from their respective federal governments. No electric utility has yet to build an IGCC facility with a new generating capacity of 1320 MW – the production capacity of the proposed Pee Dee project.

In the case of the two U.S. facilities, they are IGCC demonstration plants that were funded by federal grants from the U.S. Department of Energy (DOE). Both are single train systems each consisting of one gasification process, one gas cleanup process, one combustion turbine, and one steam turbine. The DOE demonstration plants have net generating capacities that are significantly below the 1320 MW of baseload capacity that Santee Cooper has planned for the Pee Dee facility. Tampa Electric's Polk Power Station in Florida has a net generating capacity of 250 MW, while Cinergy's Wabash River facility in Indiana has a net capacity of 262 MW. Both plants use petroleum coke, instead of coal as their predominant fuel. Reports indicate that the Polk Power Plant has been operating on a 55/45 petroleum coke/coal feed and the Wabash plant has operated on 100% petroleum coke since the DOE demonstration program ended in 2000. Notably, petroleum coke is a waste byproduct from oil refining that offers better IGCC performance and reliability due to low ash and high heating value.

ii. IGCC is much less reliable and a more costly alternative.

Reliability is another major concern with the current vintage of IGCC technology. The two DOE demonstration plants operated at annual availabilities below 60% in the early years and were only able to achieve availabilities in the 70 to 80% range after five years of operation and substantial efforts to improve performance and reliability of the IGCC process. None of the four IGCC plants to date has achieved sustained reliability levels of 85%, as initially expected. The peak reliability achieved at each of the four IGCC plants currently in operation is presented below:

Facility	Location	Peak Reliability	Year Achieved
Polk Power Station	Florida	82%	9th Year
Wabash River	Indiana	78%	7th Year
Nuon	Netherlands	78%	11th Year
Elogas	Spain	60%	5th Year

Notably, none of these four units have come close to achieving for sustained time periods the 90 to 95+% availability levels that are necessary for a "must-run" baseload plant like

the proposed Pee Dee station.[9] This significant reduction in plant reliability is not offset by a demonstrated improvement in performance. The current vintage of IGCC technology is not 10 to 20% more efficient that the SCPC technology proposed for the Pee Dee facility, as suggested in the SELC comments.[10] The efficiencies of both technologies are roughly the same. Hence, the greenhouse gas emissions will be roughly the same as well.

Importantly, reduced availability of the Pee Dee generation presents much greater energy reliability risks to small electric utilities – like Santee Cooper – whose total system generating capacities are relatively much smaller than the generating capacity of the larger electric utilities, such as Duke Power and American Electric Power (AEP). The new Pee Dee generation will represent just below 25% of Santee Cooper's total system generating capacity even with the addition of 1200 MW from the new Cross generating capacity. This means that the forced shutdown of the Pee Dee facility due to reduced availability of the unproven IGCC technology could effectively reduce by almost 25% the amount of generation available to meet native load demands. The potential loss of this generation poses significant reliability risks to its customers and, in many cases, will force Santee Cooper to cover its shortfall in generating capacity through power purchases on the wholesale market at peak energy prices. In contrast, these energy and cost risks can be more easily managed by the much larger electric utilities that can better compensate for lost generating capacity of any particular unit.

Two options to increase IGCC availability are not feasible for the Pee Dee Project. The use of natural gas as a backup fuel is not feasible given the insufficient supplies of uninterruptible natural gas in the Pee Dee area and significant price volatility to the extent such supplies were to become available. Another undesirable option is the use of one or more spare gasifiers with each IGCC train. Although this approach should improve the IGCC availability problem, there is no demonstrated experience showing that a spare gasifier alone would solve the full range of reliability problems that have been endemic to the IGCC technology to date. We have seen no claim by an IGCC vendor that its system will achieve 95% availability, even with a spare gasifier. Unplanned outages are very expensive to Santee Cooper due to emergency repairs, labor, lost electricity production and/or the need to purchase replacement power. In any event, IGCC plants have, to date, not come close to achieving the 90 to 95% availability factors that are routinely achieved by new pulverized coal boilers in the electric power sector. Moreover, the use of a spare gasifier for each IGCC train will further drive capital costs

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[9] Although not an IGCC plant, the Eastman Kodak facility in Tennessee has been cited as a successful implementation of gasification technology due to reliability levels of around 98% in recent years. However, the Kodak facility has a spare gasifier and the estimated reliability likely would drop below 90% if it were not operated with the spare gasifier. It should also be noted that Eastman Kodak has achieved high levels of reliability in part due to having over 20 years of operating experience with gasification technology. In contrast, the power sector has very limited practical experience in the extended operation of the various IGCC technologies. Also, operating a gasifier by itself is significantly less difficult and complicated than using a gasifier as an integrated part of a complex IGCC plant that generates electricity. A component failure in any of the systems often leads to the entire plant being shut down.

[10] SELC Comments at page 23.

up to unacceptable levels that render the IGCC economically infeasible at this time for the Santee Cooper system.

A more detailed discussion of the cost considerations is presented below in Section III of this paper. This cost analysis highlights that cost of generating electricity from an IGCC unit is conservatively estimated to be at least 15% greater than from a comparable SCPC system. This translates into additional annualized cost of approximately $50 million for constructing a 1300 MW IGCC facility, as compared to a similarly sized SCPC facility.

As noted below, the difficulty in estimating IGCC costs is that cost data for new IGCC units are rare because IGCC units have not been built since 1998, and vendors are not advertising their capital costs for planned units. However, the public information generally indicates that total costs of building and operating a comparably sized IGCC plant could be 25 to 30% higher than such total costs for the Pee Dee facility. This cost differential helps to explain why many IGCC plants currently under development will be economically viable only if they are subsidized through federal grants or state rate-recovery provisions. Notable examples of IGCC projects receiving federal subsidies include those under development in Orlando (by Southern and Orlando Utilities Commission), Edwardsport (by Duke), Polk (by TECO), and Mesaba (by Excelsior). Similarly, AEP has requested special customer surcharges to ensure that "costs can be recovered" for its two proposed IGCC plants in Ohio and West Virginia and is not likely to move forward with those projects without obtaining additional funds necessary to cover the increased costs of building and operating the IGCC technology. Santee Cooper will provide a more detailed discussion of these and other relevant cost considerations in Section III of this paper.

E. Santee Cooper Selected SCPC Technology as the Best Alternative.

Santee Cooper selected SCPC technology as the preferred alternative to provide 1320 MW of reliable and low-cost baseload power. The construction of this baseload generating capacity is necessary for Santee Cooper to meet its near-term future energy demands. The two 660 MW SCPC units will operate at supercritical steam conditions to maximize generation efficiency of the coal-fired units and employ advanced pollution control technologies to minimize emissions. Emission controls will include combustion controls, selective catalytic reduction, dry electrostatic precipitation, wet limestone scrubbing, and sorbent injection. The combination of high electricity production efficiency and state-of-the-art emission controls will minimize annual emissions to BACT performance levels for a new coal-fired electric generating unit. For all of the reasons described above, Santee Cooper has concluded that the selection of state-of-the-art SCPC technology provides the best alternative to meet the goals of adding over 1300 MW of new, environmentally responsible, highly reliable, low-cost baseload power generation capacity to its system within near-term planning horizons.

II. PSD Regulation of Greenhouse Gas Emissions Is Premature.

The application for the Pee Dee project effectively analyzed the control technologies and appropriate BACT levels for the comprehensive list of pollutants regulated by the PSD program. Such pollutants include: NO_x, SO_2, PM, lead, CO, VOC, sulfuric acid mist, and fluorides. For each of these pollutants, Santee Cooper evaluated the available control technologies using the accepted, "top-down BACT analysis." In addition to this suite of air pollutants, the Pee Dee application also prepared a technical assessment of other air pollutants regulated by the CAA but not specifically regulated under the PSD program. These non-PSD air pollutants included acid gases, trace metals, and mercury that are regulated under other sections of the Act. Santee Cooper determined that BACT-levels of "co-benefit" controls would also be achieved for these non-PSD pollutants through pollution control technology that will be installed for meeting the proposed BACT emissions limits for the PSD-regulated air pollutants.

With respect to CO_2 or other greenhouse gas (GHG) emissions not regulated by the CAA and its programs, it would be utterly premature for DHEC to attempt – for the first time – regulating such emissions through the pending PSD permit for the Pee Dee facility. As discussed below in greater detail, the Supreme Court has recently held that EPA has CAA authority to regulate GHG emissions. However, nothing in the Supreme Court's decision can be interpreted to require such regulation under any CAA regulatory program, including the NSR/PSD permitting program being administered by DHEC. In absence of any legal change in existing PSD regulatory requirements, it is inappropriate for DHEC to make a unilateral decision to regulate GHG emissions on an *ad hoc* basis in the context of the Pee Dee PSD permitting process. Such a decision by DHEC gets ahead of the federal regulatory process on how to handle the climate change issues, short circuits the Governor's initiative to formulate South Carolina's response on climate change, and runs contrary to reasonable transitional rules that are likely to preclude imposing future GHG requirements on a *pending* PSD permit application. Each of these reasons is briefly discussed below.

A. The Supreme Court in Massachusetts v. EPA *Did Not Require CAA Regulation of GHG Emissions.*

A recent Supreme Court case, *Massachusetts v. EPA*, No. 05-1120 (April 2, 2007), held that EPA has the authority under the CAA to regulate emissions of greenhouse gases, including CO_2, from new motor vehicles. EPA had denied a petition filed by a number of environmental groups urging EPA to set tailpipe standards for GHG emissions. EPA denied this petition on the grounds that (1) the agency did not have the authority under the CAA to issue standards to address global climate change, and (2) even if it did, it would be "unwise to do so at this time."[11] With respect to the first issue, the Supreme Court overruled EPA and held "that EPA has the statutory authority to regulate the emission of such gases from new motor vehicles."[12]

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[11] Slip op. at 8.
[12] *Id.* at 30.

The Court also took issue with EPA's alternative basis for not regulating GHG emissions,[13] but did not go so far as to address the threshold issue of whether, on remand, "EPA *must* make an endangerment finding, or whether policy concerns can inform EPA's actions in the event that it makes such a finding." [14] Rather, the Court vacated EPA's decision not to regulate GHG emissions from vehicles and instructed EPA – in any future regulatory decision – to "ground its reasons for *action or inaction* in the statute."[15] According to the Court, EPA may decline to regulate GHG emissions under the CAA "if it determines that greenhouse gases do not contribute to climate change or if it provides some reasonable explanation as to why it cannot or will not exercise its discretion to determine whether they do." [16]

The Court's opinion leaves little doubt that the threshold for regulating GHG emissions has not yet been crossed. It is entirely possible that EPA may find that greenhouse gases do not endanger public health or welfare under the statutory test.[17] Furthermore, considerable uncertainty exists as to the nature and scope of future CAA regulation of GHG emissions even if EPA were ever to make such an endangerment finding at some future point in time. It, for example, is possible that EPA might limit future GHG regulation to motor vehicles under Title II of the Act. Similarly, it is far from clear as to how and when stationary sources might be regulated under Title I of the Act in the event EPA were ever to make an affirmative decision to regulate GHG emissions from stationary source categories. Important policy and implementation issues include whether CO_2 and other greenhouse gases should be regulated as criteria air pollutants through state implementation plans under CAA section 110 or as non-criteria air pollutants through the NSPS regulatory framework under CAA section 111. Figuring out these and other implementation details is certainly no small task, especially considering that the statute fails to provide specific guidance on regulating GHG emissions and that EPA will therefore need to address many important and complex policy and legal issues of first impression in order to develop a cohesive climate change regulatory program.[18] Given the lack of a set regulatory program for greenhouse gases, it

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[13] The Supreme Court rejected EPA's "laundry list" of reasons why it would be "unwise" to regulate GHG emissions at this time because none of these reasons directly related to the statutory requirement to make an endangerment finding – the threshold for regulating GHG emissions. *Id.* at 31. Notably, GHG emissions from motor vehicles may not be regulated under Title II of the CAA until EPA makes an affirmative determination that such GHG emissions may be reasonably anticipated to endanger public health and welfare." CAA § 202(a), 42 U.S.C. § 7521.

[14] *Massachusetts,* slip op. at 32 (emphasis added).

[15] *Id.* (emphasis added).

[16] *Id.* at 30.

[17] The statutory test for CAA regulation of motor vehicles under Title II is whether greenhouse gases "cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare" and that this determination is left to EPA's discretion. CAA § 202(a)(1), 42 U.S.C. § 7521(a)(1). Identical statutory tests for endangerment apply for the listing of criteria air pollutants regulated under Title I of the Act, 42 U.S.C. §§ 7408, 7409, and setting new source performance standards and existing source guidelines for non-criteria regulated pollutants under CAA section 111. 42 U.S.C. § 7411(b).

[18] Many difficult regulatory decisions would need to be addressed on how DHEC might regulate CO_2 in the context of a PSD permit. One notable issue pertains to how DHEC might undertake a BACT analysis for any GHG emissions without *any* notion of what the requirements for regulating such pollutants would be. An analysis as precise as the one required for BACT demands that an applicant have a working understanding of the programmatic requirements, available control technologies, and expected emissions

would be premature for DHEC to make a decision to regulate CO_2 emissions in the context of the Pee Dee permit.

B. DHEC Should Not Preempt the Governor's Initiative to Develop South Carolina's Response on Climate Change.

A DHEC decision to regulate GHG emissions through PSD permitting would also short circuit the stakeholder process that has been initiated in South Carolina to address climate change. As DHEC is well aware, Governor Sanford established on February 16, 2007 the Climate, Energy, and Commerce Advisory Committee. The Committee is charged with undertaking a "comprehensive review" of environmental, energy, and other important facets of the climate change issue and, based on that review, developing "specific recommended actions" on how South Carolina should respond. Santee Cooper urges that DHEC not preempt the process that the Governor has initiated and allow the Committee to develop recommendations on how South Carolina should respond to the climate challenge.

C. EPA Transitional Guidance Would Preclude the Imposition of Future GHG Requirements on Pending PSD Permit Applications.

With all of the uncertainty surrounding EPA's future course of action on GHG emissions, the only option a present permit applicant like Santee Cooper has is to move forward within the present and applicable PSD permitting regime. Even if EPA exercises its discretion to regulate GHG emissions at some future point in time, formal action and implementation of its chosen regulatory path will not occur overnight and is unlikely to occur during the PSD permitting phase of Pee Dee project. Furthermore, such a future EPA decision to regulate GHG emissions should not require the reopening of the pending Pee Dee permit application that DHEC has deemed to be complete for purposes of the current PSD program requirements

This approach of not requiring the reopening of the pending PSD permit is consistent with EPA guidance with respect to other new air regulatory requirements. For example, during the implementation of the 1990 CAA Amendments, EPA issued transitional guidance on the changes to the PSD applicability coverage that resulted from Congress' amendments to expand Class I area boundaries. EPA stated that it did "not believe that Congress intended to create turmoil which would occur if this redesignation required the modification of permits" issued prior to the effective date of the 1990 CAA Amendments, "or the re-submission and reevaluation of complete permit applications submitted prior to the enactment of the 1990 Amendments."[19] Thus, the new Class I status of certain areas did not trigger a reopening of pending permit applications that the

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reductions, among others, for the pollutants considered. Such precision is completely lacking here. In addition, regulating CO_2 would have little practical effect in setting emissions limits for the Pee Dee facility. As discussed below in Section III, the primary reason for this is that IGCC would be eliminated as an available control alternative under multiple steps of the top-down BACT analysis.

[19] *See* New Source Review Program Transitional Guidance, from John Seitz to Regional Offices, at 4 (March 11, 1991).

permitting authority had deemed to be complete prior the enactment date of the CAA Amendments. This scenario is clearly analogous to a situation (if it were ever to occur) where EPA would decide to regulate GHG emissions as air pollutants under the CAA. In the event of such a major regulatory shift, EPA would have an obligation to develop reasonable transition rules that would exclude complete PSD permit applications that are still pending at the point EPA develops any new regulatory regime for greenhouse gases.[20]

In summary, as this discussion demonstrates, to import the consideration of greenhouse gas emissions into the current BACT analysis for the Pee Dee project is premature and inappropriate. The Pee Dee BACT analysis is comprehensive and complies to the fullest extent with all the requirements in the PSD program. Each discrete aspect of this analysis is further discussed in Section III.

III. Consideration of IGCC is not Legally Required in Setting the BACT Emissions Limits for the Proposed Pee Dee Facility.

As explained in our PSD permit application, Santee Cooper eliminated IGCC as a reference control technology for setting BACT emissions standards for the proposed Pee Dee facility. Notably, IGCC was eliminated under several steps of "the top-down BACT analysis." This section begins with a brief overview of the top-down BACT analysis and then provides further support for the decision to eliminate IGCC as a control technology on the following technical grounds:

- *IGCC is not a potentially available control option under step one* of the BACT analysis because application of the technology would redefine the proposed source due to fundamental design differences between IGCC technology and the SCPC technology.

- *IGCC is not a technically feasible control option under step two* of the BACT analysis because the technology is neither commercially demonstrated nor available electric generating technology.

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[20] While EPA has issued transitional guidance in other contexts indicating that sources should comply with new requirements if a permit is still pending as of the effective date of those requirements, EPA's application of this policy has been limited to instances where the agency was merely transitioning to more stringent levels of NAAQS already in existence. *See* Letter from S. Rothblatt to J. McCabe, Implementation of New Source Review in Areas to be Designated as Nonattainment for the New 8-Hour Ozone Standard (Feb. 26, 2004). This is *very different* from the establishment of a brand new regulatory regime for GHG emissions. Such a new regulation would not be a mere tightening of standards applicable to a pollutant already regulated under the CAA. Rather, such an action by EPA, *at the very least*, would require an entirely new realm of analysis and modeling that cannot be predicted at this time. Furthermore, as EPA recognized during the implementation of the 1990 CAA Amendments, requiring permit applicants to re-open permits at some unknown point in time to account for an entire suite of new regulatory requirements would create "turmoil" among the regulated community and the state permitting authorities. Thus, it would be unlikely, as a matter of policy, that EPA would apply this other trend of guidance in the context of the regulation of greenhouse gases.

- *IGCC is not a cost-effective control option under step four* of the BACT analysis given that the estimated costs of an IGCC unit is at least 15% greater than the costs of a comparable SCPC system.

Santee Cooper is presenting each of these technical factors as independent grounds for eliminating IGCC under the top-down BACT analysis. This additional analysis is being provided in full to DHEC even though IGCC would redefine the proposed source under the first step of the analysis and that fact alone puts an end to the BACT analysis for a SCPC facility.

A. EPA's Top-Down BACT Policy Provides a Clear Framework to Evaluate Control Alternatives for the Proposed Pee-Dee Facility.

The CAA requires new major stationary sources to employ BACT in order to minimize emissions of regulated air pollutants.[21] BACT is a case-by-case, site-specific determination resulting in the selection of an emission limitation that represents application of advanced air pollution control technologies or methods appropriate for the particular facility.[22] BACT is defined by the statute in relevant part as follows:

> an emission limitation based on the maximum degree of reduction of each pollutant subject to regulation under this chapter emitted from or which results from any major emitting facility, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility through application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of each such pollutant.[23]

EPA has established a clear framework for identifying, ranking and evaluating the effectiveness of all available control technologies. That framework is referred to as "the top-down BACT analysis" and consists of a five-step technical analysis that has been extensively described in the *NSR Workshop Manual*, EPA policy guidance, and decisions of the Environmental Appeals Board (EAB).

The first step of the top-down BACT analysis requires the permitting authority to identify all potentially available control options.[24] Available control options are those

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[21] CAA § 165(a)(4), 42 U.S.C. § 7475(a)(4). *See also* 40 C.F.R. § 52.21(j)(2)(2006)(PSD regulatory definition of BACT).

[22] *In re Cardinal FG Co.*, PSD Appeal No. 04-04, slip op. at 12 (EAB Mar. 22, 2005); *In re Three Mountain Power, L.L. C.*, 10 E.A.D. 39, 47 (EAB 2001); *In re Knauf Fiber Glass, GmbH*, 8 E.A.D. 121, 128-29 (EAB 1999); *see also In re Certain Teed Corp.*, 1 E.A.D. 743, 747 (Adm'r 1982) ("It is readily apparent ... that ... BACT determinations are tailor-made for each pollutant emitting facility.").

[23] CAA § 169(3), 42 U.S.C. § 7479(3)

[24] *See* NSR Workshop Manual at B.5.

technologies, including the application of production processes or innovative technologies, "that have a practical potential for application to the emissions unit and the regulated pollutant under evaluation."[25] As discussed below in Section B, a technology – even if it is commercially available – need not be considered in the BACT analysis if the application of that technology would require the permitting authority to redefine the basic design of the proposed project.

The second step is to eliminate "technically infeasible" control options from the potentially available options identified at step one of the BACT analysis.[26] This second step involves first determining for each technology whether it is "demonstrated," which means that it has been installed and operated successfully elsewhere on a similar facility, and if not demonstrated, then whether it is both "available" and "applicable." In such cases, technologies identified in step one as potentially available, but that are determined not to be both available and applicable, are eliminated under step two from further analysis.[27]

In step three of the top-down analysis, the remaining control technologies are ranked and then listed in order of control effectiveness for the pollutant under review, with the most effective alternative at the top.[28] A step-three analysis includes making determinations on the comparative control efficiency among control techniques employing different emission performance levels and different units of measure of their effectiveness.[29]

In the fourth step of the analysis, the energy, environmental and economic impacts are considered and the top alternative is either confirmed as appropriate or is determined to be inappropriate.[30] Issues regarding the cost effectiveness of the alternative technologies are considered under step four.[31] The purpose of step four of the analysis is to validate the suitability of the top control option identified, or provide a clear justification as to why the top control option should **not** be selected as BACT.[32] Elimination of a control option can be justified if "cost of pollutant removal (*e.g.*, dollars

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[25] *Id.*
[26] *See id.* at B.7.
[27] *Id.* A technically feasible control alternative also may be eliminated at step two from further consideration if that alternative achieves "essentially equivalent emissions" as the technology alternative selected for full evaluation under the BACT analysis. *Id.* at B. 20-21. *See also Prairie State Generating Company*, slip op. at 46 (discussing the rule that "a full analysis is not required where control options are, in effect, redundant"). Notably, the EAB in *Prairie State Generating* recognized that a full BACT evaluation was not necessary for IGCC because "IGCC's achievable control effectiveness, at this time, is similar to the control alternatives ... proposed as BACT and selected as the top alternative" for a pulverized coal technology option. *Id.* at 44-49. Although Santee Cooper is not providing a detailed comparison of IGCC and SPCC technologies, the EAB decision in *Prairie State Generating* provides general support for the conclusion that IGCC is an essentially equivalent technology for which a full BACT analysis is not necessary.
[28] *See* NSR Workshop Manual at B.7.
[29] *Id.* at B.22-25.
[30] *Id.* at B.29.
[31] *Id.* at B.31-46.
[32] *Id.* at B.26.

per total ton removed) for the control alternative are disproportionately high when compared to the cost of control for the pollutant in recent BACT determinations."[33]

Finally, under step five, the most effective control alternative not eliminated in step four is selected and the permit issuer sets as BACT an emissions limit for a specific pollutant that is appropriate for the selected control method.[34]

B. Step 1: IGCC is not a Potentially Available Control Technology.

As described above, the first step of the BACT analysis requires the permitting authority to identify all available control options that may have "a practical potential application" to the proposed new source. This obligation to review potentially available control technologies is subject to specific limits that are clearly delineated in the NSR Workshop Manual, other EPA policy guidance, and EAB decisions. One notable limitation relates to the evaluation of alternatives to the proposed project. In particular, the permitting authority is not required to consider in the BACT analysis those alternative technologies that would fundamentally change the scope, or redefine the basic design, of a proposed project.[35]

EPA's policy reflects the Agency's longstanding judgment that there should be limits on the degree to which permitting authorities can dictate the design and scope of a proposed facility through the BACT analysis. This policy is based on EPA's reasonable interpretation of sections 165 and 169(3) of the CAA, which recognizes that, although the permitting authority must take comment on and may consider alternatives to a proposed facility, the BACT analysis itself is done without changing fundamental characteristics of the proposed source.

This section begins with a review of the legal basis and well-established precedent for the current federal policy against redefining a source. It then provides a technical assessment of the factual reasons why the application of IGCC technology would redefine the basic SCPC design of the proposed Pee Dee facility. Based on the fundamental differences between the IGCC and SCPC technologies, as discussed below, Santee Cooper believes that it is appropriate for DHEC to eliminate IGCC as a potentially available control technology under step one of the BACT analysis.

i. The statute authorizes the current EPA policy for limiting BACT analysis to technologies that do not redefine the proposed source.

The language in sections 165 and 169 of the CAA distinguishes between the consideration of alternatives to a proposed source on the one hand and permitting and

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[33] *Id.* at B. 36-45 (discussing cost effectiveness for a BACT analysis).
[34] *Id.* at B.53. *See also In re Hillman Power Co.*, 10 E.A.D. 673,677 (EAB 2002); *In re Three Mountain Power, LLC*, 10 E.A.D. 39, 42 n.3 (EAB 2001).
[35] *See, e.g., In re Knauf Fiber Glass, GMBH*, 8 E.A.D. 121, 140 (EAB 1998); *In the Matter of Old Dominion Electric Cooperative Clover, Virginia*, 3 E.A.D. 779, 793 n. 38 (Adm'r 1992); *In the Matter of Pennsauken County, New Jersey, Resource Recovery Facility*, 2 E.A.D. 667, 673 (Adm'r 1988).

selection of BACT for the proposed source on the other. Alternatives to a proposed source are evaluated through the public hearing process that is required under section 165(a)(2) of the Act. This provision requires that before a permitting authority may issue a permit, interested persons must have an opportunity to "submit written or oral presentations on the air quality impact of such source, *alternatives thereto,* control technology requirements, and other appropriate considerations."[36] By listing "alternatives" and "control technology requirements" separately in section 165(a)(2), Congress distinguished "alternatives" to the proposed source that would wholly replace the proposed facility with a different type of facility from the kinds of "production processes and available methods, systems and techniques" that are potentially applicable to a particular type of facility and should be considered in the BACT review.[37]

In contrast to the requirements of section 165(a)(2), other parts of the PSD permitting process, including the requirement to apply BACT, focus on, and are generally confined by, the project as proposed by the applicant. Sections 165(a)(l) and 165(a)(4) of the Act provide that no facility may be constructed unless "a permit has been issued for *such proposed facility* in accordance with this part" and "the *proposed facility* is subject to best available control technology for each pollutant subject to regulation under the Act."38 The statutory definition of BACT in CAA section 169(3), as set forth above, also makes it clear that the BACT review is based on the proposed project, as opposed to something fundamentally different. Of particular note, the phrases "proposed facility" and "such facility" in these statutory provisions refer to the specific facility proposed by the applicant, which has certain inherent design characteristics. The Act also requires BACT to be determined "on a case-by-case basis." The case-specific nature of the BACT analysis indicates that the particular characteristics of each facility are an important aspect of the BACT determination. Thus, the Act requires that permitting authorities determine BACT for each facility individually, considering the unique characteristics and design of each facility.

In conclusion, the statute does provide authority for permitting authorities in selecting BACT to consider "application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques."[39] In exercising this authority, permitting authorities may require a source to make some design changes to the proposed source.[40] However, EPA policy has repeatedly and clearly confirmed that a permitting authority may require the consideration of such design changes only to the extent that these alternatives do not fundamentally redefine the basic design or scope of the proposed project.

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[36] CAA § 165(a)(2), 42 U.S.C. § 7475(a)(2) (emphasis added).
[37] CAA § 169(3), 42 U.S.C. § 7479(3).
[38] CAA § 165(a)(1), 42 U.S.C. § 7475 (a)(1) (emphasis added).
[39] *Id.*
[40] *See In re Knauf,* 8 E.A.D. at 136.

ii. EAB decisions and EPA policy guidance recognize and affirm the current rule for limiting BACT analysis to technologies that do not redefine the proposed source.

PSD appeal decisions reviewing the BACT process and EPA's longstanding BACT guidance demonstrate that the agency does not consider the BACT requirement as a means to redefine the design of the source when considering available control alternatives. One of first instances when EPA articulated this policy was a 1988 EAB decision entitled *In the Matter of Pennsauken County, New Jersey, Resource Recovery Facility.*[41] Since that decision, EPA and the EAB have adhered to the policy against redefining the basic design of the proposed source in the BACT analysis. Notably, this position has been confirmed by EPA over 15 years ago in the *NSR Workshop Manual* and in numerous subsequent decisions issued by the EAB.[42] The agency has done so based on clear statutory authority for the permitting authority to distinguish between basic design aspects of the facility proposed by the applicant that must be fixed to enable a case-by-case review and the types of processes, methods, systems, and techniques that are potentially applicable to a specific facility to control air emissions.

In *Pennsauken*, the petitioner urged EPA to reject a PSD permit for a proposed municipal waste conductor in favor of using existing power plants to co-fire a mixture of refuse derived fuel and coal.[43] The EAB acknowledged that the statutory language in the BACT definition may require application of processes, methods, systems, and techniques, but concluded that "permit conditions that define these systems are imposed on the source as the applicant has defined it" and that "the source itself is not a condition of the permit."[44] In reaching this conclusion, the EAB recognized that it would not be possible to conduct a case-by-case review of BACT for each facility without accepting the proposed source as defined by the applicant.[45]

The policy against redefinition of the source in the BACT process as set out in *Pennsauken* was incorporated into EPA's BACT guidance in the *NSR Workshop Manual*:

> [h]istorically, EPA has not considered the BACT requirement as a means to redefine the design of the source when considering available control alternatives. For example, applicants proposing to construct a coal-fired electric generator, have not been required by EPA as part of a BACT analysis to consider building a natural gas-fired electric turbine although

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[41] 2 E.A.D. 667, 673 (Adm'r 1988).

[42] EPA, for example, does not require applicants proposing to construct a coal-fired power plant to consider building a natural gas-fired combustion turbine as part of the BACT analysis for the electric power project. *See, e.g., In re Prairie State Generating Company,* PSD Appeal No. 05-05 (Aug. 24, 2006); *In re SEI Birchwood Inc.*, 5 E.A.D. 25 (EAB 1994); *In re Old Dominion Electric Cooperative*, 3 E.A.D 779 (EAB 1992). *See also, In re: Prairie State Generating Company,* PSD Appeal No. 05005 (August 24, 2006).

[43] 2 E.A.D. at 673.

[44] *Id.*

[45] As *Pennsauken* illustrates, taken to its furthest extreme, the application of any inherently lower polluting process could result in elimination of the source altogether, which would not be consistent with subjecting the "proposed source" to BACT, as determined on a case-by-case basis.

> the turbine may be inherently less polluting per unit product (in this case electricity). However, this is an aspect of the PSD permitting process in which states have the discretion to engage in a broader analysis if they so desire. Thus a gas turbine normally would not be included in the list of control alternatives for a coal-fired boiler.[46]

Although in *Pennsauken* the EAB addressed the situation where the rejected alternative would have constituted a reclassification of the "source category" (*i.e.,* seeking to substitute a municipal waste conductor for existing power plants), the *NSR Workshop Manual* as cited above and subsequent EAB decisions indicate that the agency's policy against redefining the source is not confined just to the redefinition of the "source category."

As noted in the *NSR Workshop Manual*, EPA does not require those applicants proposing to construct a coal-fired power plant to consider building a different type of electric generating facility, *e.g.*, a natural gas-fired combustion turbine, as part of the BACT analysis for the electric power project.[47] In the EAB decision for *In re Old Dominion Electric Cooperative*, the EAB found no clear error in the state's rejection of a challenger's proposal to substitute one type of electric generating facility (a natural gas-fired facility) for the proposed coal-fired generating facility.[48] Similarly, in the opinion for *In re SEI Birchwood Inc.*, the EAB rejected a petitioner's assertion that the state failed to satisfy BACT where the state did not substitute the proposed type of generating facility (a coal-fired electric generating facility) for a different type of electric generating facility (a natural gas-fired facility) because the switch would redefine the source.[49]

The EAB consistently applied this policy again when considering the source at issue in *In re Hawaiian Commercial & Sugar Co.*, where it rejected petitioner's assertion that the state should require the proposed facility to install a different kind of boiler.[50] The project proponent proposed to construct a CFB boiler. The petitioner argued that the state should require the project proponent to instead install a combined cycle facility fueled with low sulfur distillate or residual oil. The EAB upheld the state's decision to reject petitioner's claim, because "[p]etitioner's preference as to the type of boiler and fuel to be used in this instance would in effect redefine the source."[51]

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[46] NSR Workshop Manual at B.13.
[47] *Id.*
[48] 3 E.A.D. 779 (EAB 1992).
[49] 5 E.A.D. 25 (EAB 1994).
[50] 4 E.A.D. 95 (EAB 1992).
[51] *Id.* at 100. Given that BACT determinations are dependent on the facts of each project, the EAB does not always determine that the applicant need not consider a different fuel than what was proposed by the applicant. For example, in *Hibbing Taconite Co.*, EPA Region V petitioned for review of the Minnesota Pollution Control Agency's permit determination authorizing an applicant to modify its existing furnaces. One purpose of the applicant's modification was to equip the existing facility, which was already equipped to burn, and had been using natural gas, to instead burn petroleum coke as fuel. The EAB agreed with petitioner's argument that the applicant's BACT analysis was erroneous because the applicant did not justify rejecting the burning of natural gas as a viable control strategy. However, the EAB reached its conclusion that it would be reasonable to require the applicant to consider natural gas and that the alternative "would not require a fundamental change to the facility" in light of the fact that the facility was

As these earlier cases illustrate, the EAB has frequently recognized that the policy against redefining the source may be more narrowly defined than the "source category." This policy also has been applied in recent cases as well as can be seen in the decision for *In re Prairie State Generating Company*. In that case, the EAB indicated that the proper way of framing the "source" for purposes of analyzing and applying the policy against redefinition of the source is not to merely look broadly at the source category (*e.g.*, an "electric generating facility") but to look at "how the applicant, in proposing the facility, defines the goals, objectives, purpose, or basic design for the proposed facility" in its application.[52] Further, the EAB specifically rejected the petitioner's contention that an electric generating facility's purpose must be viewed as broadly as "the production of electricity, from coal."[53]

When viewed in the context of the EPA guidance and EAB decisions, Santee Cooper's rejection of IGCC in the first step of the BACT analysis is appropriate and consistent with EPA's longstanding BACT requirements. EPA has affirmed this approach in the policy guidance issued on December 13, 2005, which addressed the consideration of IGCC in the first step of the BACT analysis.[54] Notably, the EPA policy guidance stated that "consistent with EPA's established BACT policy, it would not require an applicant to consider IGCC in a BACT analysis for a supercritical pulverized coal unit" and, as result, "EPA would not include IGCC in the list of potentially applicable control options that is compiled in the first step of a top-down BACT analysis."[55] In so doing, the EPA has continued to recognize that the BACT review should not be used to frustrate an applicant's ability to construct a particular type of facility in order to meet objectives that may be independent of environmental protection. As the EAB affirmed in its recent *Prairie State* decision, the BACT review requires an applicant to take a "hard look" at how its proposed facility may be improved to reduce its environmental impact, but that review must occur on a case-by-case basis within the framework of the basic facility design proposed by the applicant.[56]

The EPA policy guidance on IGCC remains in effect after a recent settlement that EPA reached with environmental groups that had filed a legal action in court challenging the new IGCC policy. Importantly, the settlement does not repudiate, withdraw or limit *in any way* the general principles and positions articulated in the current IGCC policy statement referenced above for setting BACT/LAER standards under the NSR program. Rather, the settlement only clarifies that the IGCC policy, as articulated in the EPA letter from Stephen G. Page on December 13, 2005, "is not a final agency action and creates no

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already equipped to burn and had historically relied upon natural gas for fuel. 2 E.A.D. 838 (1989). Obviously this type of case is very different from the Pee Dee project – *e.g.*, a "greenfield" facility for which there are supply constraints limiting the use of natural gas and technology constraints limiting the generation of power through the IGCC process.

[52] *Prairie State Generating Company*, slip op. at 30.

[53] *Id.* at 32.

[54] *See* EPA Letter from Stephen D. Page, Director of EPA Air Quality, Planning and Standards, to Paul Plath E3 Consulting, LLC (December 13, 2005).

[55] *Id.*

[56] *Prairie State Generating Company,* slip op. at 33-37.

rights, duties, obligations, nor any other legally binding effects on EPA, the states, tribes, any regulated entity, or any person." Thus, the principles and positions articulated in the EPA policy statement continue to remain in effect, and DHEC may exercise its discretion to follow that EPA policy in reviewing the PSD permit application for the proposed Pee Dee facility. Indeed, the IGCC guidance in the Page letter informs the BACT analysis to the same degree as other EPA guidance on the topic, namely the *NSR Workshop Manual*, which has been cited throughout EAB decisions by the EAB, project proponents and challengers as well as by other EPA guidance over the years. This also means that the EPA policy guidance on IGCC – which the SELC dismissed as no longer valid in its comments on the Pee Dee application – in fact stands on equal legally footing with the *NSR Workshop Manual*, upon which the SELC cites in support of its legal positions on other PSD permitting matters.

iii. BACT definition authorizes consideration of "methods, systems, and techniques," but does not override the permitting authority's discretion to apply the limitation on redefinition of the source.

As noted earlier, the BACT analysis may include consideration of "production processes," "innovative fuel combustion techniques," and "fuel cleaning." The flexibility in the statute does not, however, override a state permitting authority's discretion to refrain from considering certain alternatives when engaging in the BACT analysis if such measures will redefine the source.

For example, in response to the challenge to the BACT analysis in *Hawaiian Commercial & Sugar Co.*, where the petitioner asserted that the state should have required installation of a different type of boiler and use of a different type of fuel than that proposed by the permit applicant, the state permitting authority indicated that it did not have authority to define the boiler type to be used, nor to generally require an applicant to use a specific equipment, fuel, or air pollution control device.[57] The EAB addressed this in a footnote, explaining that the definition of BACT includes consideration of both clean fuels and use of air pollution devices. However, the EAB went on to state in its opinion that the PSD regulations *do not* mandate that the permitting authority redefine the source in order to reduce emissions.[58]

The ability of the state to exercise discretion in the BACT analysis is also evident in the *In re Old Dominion Electric Cooperative* decision. Here, the EAB held that there was no clear error in the state's decision to refrain from considering natural gas as an alternative fuel. The EAB explained that EPA construes the CAA as "conferring discretion on the permit issuer to consider clean fuels other than those proposed by the permit applicant" and that the state, in the *In re Old Dominion Electric Cooperative* case, exercised its discretion in accordance with the statute.[59]

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[57] 4 E.A.D. 95, 99 (1992).
[58] *Id.* at 99, n. 7 (emphasis added).
[59] 3 E.A.D 779 (1992).

The state's discretion was also discussed in the recent *Prairie State Generating Company* decision. In that case, the EAB explained that while the basic design of the facility generally should not be redefined through the BACT analysis, the permit issuer has the discretion to take a "hard look' at whether the proposed facility may be improved to reduce its pollutant emissions. That hard look necessarily should include consideration of whether the permit applicant's basic design is 'independent of air quality permitting'".[60] According to the EAB in *Prairie State*, deference to the permit applicant is most appropriate in those cases where the design objectives of the proposed project relate to "reasons independent of air quality permitting."[61] The EAB determined that the permitting authority in *Prairie State* had taken a sufficient "hard look" and upheld the permitting authority's adherence to the policy against redefining the source given that requiring the use of low-sulfur coal would have required extensive design changes to the proposed facility, which was a mine-mouth facility designed to use the co-located high sulfur coal as fuel.[62]

Accordingly, while the statute confers a degree of flexibility on the state permitting authority to consider various control options in the BACT analysis, it is appropriate for the permitting authority to refrain from considering or requiring alternatives where it would result in a redefinition of the source as the applicant has defined it. Thus, while the permitting authority can consider "production processes," "innovative fuel combustion techniques" and "fuel cleaning" in the BACT analysis, it is not required to do so to the degree that the source would be redefined.

Further, the SELC arguments purporting that a single legislator's statements in a floor debate are indicative of a congressional intent to require consideration of IGCC in the BACT analysis are misguided.[63] SELC relies only on statements of Senator Huddleston in a floor debate during consideration of the 1977 CAA Amendments. The Senator addressed specifically an amendment to add the term "innovative fuel combustion techniques" to the definition of BACT and expressed his position that a BACT analysis should take gasification into account.[64] Courts have consistently held, however, that the record of a mere floor debate and a legislator announcing his individual intent of an amendment or bill is not a reliable indication of the collective intent of Congress. For example, when considering attempts to use legislative history in a similar vein, the Supreme Court has held that "even the contemporaneous remarks of a single legislator who sponsors a bill are not controlling in analyzing legislative history."[65] The

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[60] *Prairie State Generating Company*, slip op. at 34.
[61] *Id.* at 33.
[62] *Id.* at 36. Specifically, the EAB in *Prairie State* ruled: "we conclude that Petitioners have not shown that the IEPA clearly erred when it determined that consideration of low-sulfur coal, because it necessarily involves a fuel source other than the co-located mine, would require Prairie State to redefine the fundamental purpose or basic design of its proposed Facility and that, therefore, low-sulfur coal could appropriately be rejected from further BACT analysis at step 1 of the top-down BACT review method." *Id.* at pages 36-37.
[63] *See* SELC Comments at pages 5-6.
[64] 123 Cong. Rec. S9421, S9434-35 (June 10, 1977) ("I believe it is likely that the concept of BACT is intended to include such technologies as low Btu gasification and fluidized bed combustion.").
[65] *Consumer Products Safety Comm'n v. GTE Sylvania, Inc.*, 447 U.S. 102, 118 (1980); *see also Weinberger v. Rossi*, 456 U.S. 25, n.15 (1982); *Chrysler Corp. v. Brown*, 441 U.S. 281, 311 (1979).

Court of Appeals for the D.C. Circuit has also recently stated that "[t]he colloquial language of a debate is at best a rough guide to the intricacies of technical statutory wording."[66] Hence, Senator Huddleston's remarks should not be considered a precise or reliable indication of specific congressional intent to require a permitting authority to consider IGCC in any or all circumstances. Viewed within this legal context, this legislative history does not constrain a state permitting authority – such as DHEC – from exercising its discretion to refrain from considering "methods, systems, and techniques" that would redefine a source.[67]

iv. Many States have determined that IGCC technology need not be considered in the BACT analysis for new coal power plants.

A number of States have specifically ruled that IGCC need not be considered in the BACT analysis. For example, in Kentucky, the Environmental and Public Protection Cabinet's Division for Air Quality (DAQ) did not require consideration of IGCC in the BACT analysis for the PSD permit for the Thoroughbred Generating Station's pulverized coal-fired electric generating facility. The issue of whether IGCC must be considered in the BACT analysis was subsequently adjudicated as part of the review of the grant of the PSD permit. Petitioner's argued that IGCC is an "innovative fuel combustion technique" that is required to be considered under the definition of BACT. In April 2006, the Secretary of the Kentucky Environmental and Public Protection Cabinet ultimately rejected the challenge on the issue of IGCC and held that it was not error for the DAQ to refrain from considering IGCC.[68]

In February 2005, a Wisconsin administrative law judge affirmed the decision by the Wisconsin Department of Natural Resources ("Wisconsin DNR") to issue a permit to Wisconsin Electric Power Co. to construct the Elm Road Generating Station, to consist of two SCPC units and one IGCC unit.[69] The judge rejected environmental groups' claims that the Wisconsin DNR erred in excluding IGCC from its BACT analysis of the proposed plant and instead concluded that, based on the *NSR Workshop Manual*, the design of the proposed station would be redefined if IGCC units were substituted for SCPC units and, therefore, could not be required as part of BACT.[70]

In West Virginia, the Department of Air Quality ("WVDAQ"), in considering a PSD permit application for the Longview power plant, asserted its view that

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[66] *American Petroleum Institute v. EPA*, 198 F.3d 275, 280 (D.C. Cir. 2000).

[67] Even if congressional floor debates were considered reliable indicators of congressional intent, this excerpt of legislative history does not support the contention that Congress specifically contemplated that a BACT analysis should include consideration of IGCC. In 1977, the time of Senator Huddleston's remarks, the IGCC technology had not yet been deployed at any demonstration project and did not occur until about 7 years later in case of Pinon Pine IGCC demonstration project in Nevada. The Pinon Pine project was not successful and was shut down following initial startup and operation.

[68] Secretary's Findings, Conclusions of Law, and Final Order, *Sierra Club v. Environmental & Pub. Prot. Cabinet,* File Nos. DAQ-26003-037 and DAQ-26048-037, at 29-31 (Apr. 11, 2006).

[69] Findings of Fact, Conclusions of Law & Order, In re Air Pollution Control Constr. Permit Issued to Wis. Elec. Power Co., Case No. IH-04-03, at 4-5 (Wis. Div. Of Hr'gs & App. Feb. 2, 2005).

[70] *Id.* at 8-14.

consideration of IGCC is not required. In response to public comments contending that a detailed analysis of IGCC is required, the WVDAQ responded that the State's rules would allow the approval of such an innovative process technology in lieu of BACT, but would not authorize the permitting agency to require a source to consider an innovative control technology. Additionally, the agency declared that consideration of IGCC was not "appropriate for this case" considering that Longview proposed a facility design based on utilizing a pulverized coal supercritical boiler.[71]

These coal power projects represent specific examples where state permitting authorities have properly exercised its discretion to eliminate IGCC as a redefinition of the source and set BACT limits based on a pulverized coal design proposed for the power plant.

v. Technical factors support a DHEC decision that the application of IGCC technology would redefine the basic design of the proposed Pee Dee facility.

IGCC technology is fundamentally different from the SCPC technology that Santee Cooper has proposed for the Pee Dee facility. These fundamental differences relate to the basic design and operational characteristics of these two electric generating technologies. Examples of these design and operational differences include the following:

- The core process of gasification at an IGCC facility is generally more akin to technology employed in the refinery and chemical manufacturing industries than technologies in use in power generation (*i.e.*, controlled chemical reaction versus a true combustion process).

- A SCPC unit combusts coal to generate electricity. An IGCC unit gasifies the coal through a chemical reaction into syngas (consisting primarily of hydrogen and carbon monoxide), and thereafter combusts syngas product to power its combustion turbines.

- The syngas combustion in a combined cycle combustion turbine bears greater similarity to a natural gas combustion turbine than it does to a coal-fired power plant boiler.

- An IGCC facility includes a number of components that are not necessary for the operation of a SCPC facility. Components installed only at an IGCC facility include the following:

    - A cryogenic air separation unit, which generates oxygen for the gasifier and nitrogen for the combustion turbine;

[71] West Virginia DAQ, Longview, Permit No. R-14-0024, Response to Comments 2 (Comments Received Between October 1, 2003 and January 14, 2004) at 35.

- Coal gasifiers, which chemically convert a mixture of coal and water into synthetic gas (syngas), and acid gas;
- An acid gas recovery unit, which separates the sulfur from the syngas;
- A coal-slurry production facility;
- Slag handling equipment;
- A sulfuric acid production facility; and
- A flare and heat recovery steam generator.

- A SCPC facility includes components that do not exist in an IGCC facility. In the case of the proposed Pee Dee facility, these include the air quality control equipment (*e.g.*, FGD, SCR, ESP, sorbent injection), and the byproduct handling system, including a possible gypsum plant.

- Because of the different processes and components of the two generating technologies, the footprint for an IGCC facility would be from two to three and one-half times the size of the footprint of the proposed SCPC facility with similar generating capacity.

- IGCC technology would necessitate different types of expertise on the part of Santee Cooper or other electric utility to generate electricity than the expertise necessary for operating a PC combustion unit.[72]

These differences clearly demonstrate that IGCC would fundamentally change the overall scope of the project and redefine the basic design and operational characteristics of the proposed Pee Dee facility. Furthermore, these differences support a technical determination that the application of the IGCC technology would redefine the basic SCPC design of the proposed Pee Dee facility. Based on important differences between the two technologies, DHEC has ample technical support to conclude that IGCC is not a potentially available control option that DHEC must consider in performing the BACT analysis in the PSD permit proceeding for the Pee Dee project.

In conclusion, Santee Cooper urges DHEC to exercise its inherent authority to exclude IGCC as a potentially available alternative under step 1 of the top-down BACT analysis. For the reasons discussed above, such a permitting decision would be based on factual/technical information in the record and thus would be a reasonable exercise of DHEC's discretionary authority that would most likely be upheld on review. Notably, a permit will only be reviewed if there is a clearly erroneous finding of fact or conclusion of law.[73]

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[72] Santee Cooper also provides a detailed description of the design and operational differences between IGCC and SCPC technologies in its PSD permit application for the proposed Pee Dee facility. *See* Volume I of the Pee Dee permit application at pages 5-6 thru 5-7.

[73] *Prairie State Generating Company*, slip op. at 14.

C. Step 2: IGCC is not a Technically Feasible Control Option.

The second step of the BACT process allows DHEC to eliminate from the BACT analysis those potential control options that are not technically feasible. A control technology is not technically feasible if DHEC determines that the technology is neither "demonstrated" for a similar source nor both "available" and "applicable" as a control technology for that source category.[74] Santee Cooper believes ample technical information is already in the permitting record (through the permit application) to support a DHEC finding that IGCC is still a developing, but immature technology that is neither demonstrated nor commercially available and applicable for use as a baseload electric generating unit.[75] Santee Cooper provided further documentation in support of this conclusion in Section I of this supplemental submission. As explained in both technical submissions, key factors in support of this conclusion relate to the relatively low reliability and unit availability of the IGCC technology for serving as baseload electric utility unit. IGCC reliability is far less than what could be achieved for a pulverized coal combustion power plant generally and SCPC specifically. These levels are well below typical availabilities of new combustion electric utility units, which generally have availabilities at or above 95%.

Santee Cooper takes exception of numerous assertions in the SELC comments that suggest that IGCC is a proven and technically feasible technology for power generation purposes. SELC assertions that are particularly off the mark include the following:

- SELC states that "there were 117 operating gasification projects worldwide with a combined capacity of 25,000 MW of IGCC units."[76] While this statement may be technically accurate, SELC fails to note that virtually all of these projects do not involve coal gasification, nor generate electricity for sale and distribution to retail customers. The SELC assertion only confirms that *gasification* technology has been demonstrated for the chemical industry or other operating contexts not involving electric power generation. Importantly, the SELC assertion does not speak to the issue before DHEC in the permitting of the Pee Dee project, namely the demonstration and proven reliability of IGCC – which requires the integration of this gasification technology from the chemical industry with the combined cycle power generation technology from the power industry.

- SELC correctly notes the four IGCC that are currently operating worldwide, but fails to mention all four of these projects received significant amounts of co-funding from their respective federal governments. In the case of the Polk IGGC plant, TECO received through a DOE grant 20-25% of the capital cost of the plant, as well as some of the operating costs during the demonstration period. As discussed below in Section III.E, federal and state subsidies are still being provided for the deployment of IGCC technology since electric utilities are still

[74] Section III.A provides a detailed discussion of this and other steps of the top-down BACT analysis.
[75] *See* Volume I of the Pee Dee Permit Application at 5-6.
[76] SELC Comments at page 14.

unable to bear the entire costs of constructing and operating new IGCC plants.

- SELC notes that two proposed IGCC facilities have received PSD permits without providing any update on their current status.[77] As indicated in the Chart 1 (attached hereto), the Milwaukee County project was cancelled when the Wisconsin Public Utility Commission (PUC) declined to provide approval of the project based on cost considerations. Questions also remain about the viability of the other permitted IGCC project in Lima, Ohio given that the developer has reportedly initiated only minor construction activities (*e.g.*, a fuel storage facility) since the Ohio EPA issued PSD permit to construct the project on March 26, 2002.

- SELC has identified 14 other IGGC projects that – although not yet permitted – have been "proposed for commercial development in the United States."[78] Chart I (attached hereto) provides an overview of the status of these projects. Notably, one of these unpermitted projects has been outright cancelled (*e.g.*, NRG Energy, CT), while several others no longer appear to be commercially viable due to their expected failure to obtain PUC approval (*e.g.*, Excelsior Energy (Masaba) MN, NRG Energy DE). Other proposed projects will most likely not be built unless they obtained federal or state subsidies or preferential PUC rate approval in order to cover the increased costs of IGCC technology (*e.g.*, Tailorville Energy Center IN, AEP Ohio, AEP WV, Duke Energy IN, Orlando Utilities/Southern Company FL, NRG Energy DE, Tampa Electric FL). Finally, the significance of the remaining proposed projects is diminished by the fact that the developer is proposing to use predominantly petroleum coke (*e.g.*, Citgo LA, Energy NW WA, Tondu TX) or produce multiple products besides electricity (*e.g.*, Westward Energy, OR). A careful examination of these projects thus leaves a much different impression on current viability and feasibility of IGCC technology as compared to SCPC technology.

- SELC claims that "IGCC plants have demonstrated availabilities of 85% for single train gasifiers and greater than 90% for facilities with spare gasifiers."[79] SELC's claim is far from the truth. As discussed above in Section I.D, none of the four IGCC plants to date has achieved sustained reliability levels of 85%, as initially expected. The peak reliability achieved by four IGCC plants ranged from 60% to 82%. One reason for the lower availability levels is that operating a gasifier by itself is significantly less difficult and complicated than using a gasifier as an integrated part of a complex IGCC plant that generates electricity. All of these components in gasification and power block islands must be operated interdependently. The failure of one system often leads to the entire plant being shutdown. For example, whenever the gasifier is removed from service due to

[77] SELC Comments at page 15.
[78] SELC Comments at pages 15-17.
[79] SELC Comments at pages 15-17. SELC also states that IGCC plants in Italy are achieving 90 to 94% capacity factors. This statement contradicts SELC's own statements that only four IGCC are in existence worldwide and that none of them are operating in Italy.

operational problems, the gas turbine must shut down due to lack of fuel (*e.g.*, there is no syngas to power the gas turbine).[80] Other reasons for low reliability include corrosion and erosion of the gasifier refractory, corrosion of process piping, plugging of syngas heat exchangers, corrosion of process piping, slurry pump problems, and various power block problems. One such power block problem unique to IGCC facilities is the additional rotational stress to the turbine due to the fact that much greater amounts of syngas is necessary to fully load the gas turbine as a result of the syngas' much lower heating value.

D. Step 2: IGCC should be eliminated as a technology that is "essentially equivalent" to SCPC.

A technically feasible control alternative also may be eliminated at step two of the BACT from further consideration if that alternative achieves "essentially equivalent emissions" as the technology alternative selected for full evaluation under the BACT analysis.[81] Notably, the EAB in *Prairie State* recognized that a full BACT evaluation was not necessary for IGCC because "IGCC's achievable control effectiveness, at this time, is similar to the control alternatives ... proposed as BACT and selected as the top alternative" for a pulverized coal technology option.[82] The EAB decision in *Prairie State* provides general support for the conclusion that IGCC is an essentially equivalent technology for which a full BACT analysis is not necessary.

The SELC presents in its comments to DHEC a flawed analysis that does not accurately compare the projected emissions levels of the Pee Dee facility with those of the proposed Taylor Energy Center IGCC plant.[83] Specifically, SELC analysis fails to note that an IGCC unit may actually produce more emissions on an annual basis than a SCPC unit due to the frequent and lengthy startup and shutdown cycles inherent with the IGCC technology.[84] The cold-startup of an IGCC unit can take several days and, during this startup, large amounts of coal can be consumed in the gasification process while the emissions control systems are being started up. Emissions from the flaring of the syngas can be substantial given that syngas may only be partially cleaned and the flaring may go on for an extended time period. In contrast, the startup of a SCPC unit (such as the Pee Dee units) is a very different process. Oil or natural gas is fired to heat the boilers during much of the startup process and coal is fired for only a relatively short time period before the pollution control equipment comes online. This means that an IGCC facility may have a lower emissions rate on an lbs/mmBtu basis but still have roughly equal or even greater overall emissions, measured on a tons per year basis.

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[80] The use of a spare gasifier for each IGCC train will further drive capital costs up to unacceptable levels that render the IGCC economically infeasible at this time for the Santee Cooper system.

[81] NSR Workshop Manual at B. 20-21. *See also Prairie State Generating Company*, PSD Appeal No. 05-05, slip op. at 46 (August 24, 2006) (discussing the rule that "a full analysis is not required where control options are, in effect, redundant").

[82] *Prairie State Generating Company*, PSD Appeal No. 05-05, slip op. at 44-49.

[83] SELC Comments at pages 20-21.

[84] As a general matter, PSD permit applications for IGCC plants estimate a high frequency of start and shutdown events each year.

Santee Cooper urges DHEC to factor the emissions from startup in its overall emissions control comparison of the IGCC and SCPC technologies. This broader evaluation is likely to confirm that the overall control levels achieved by a IGCC unit is essentially equivalent to the control levels achieved by the proposed Pee Dee facility and this equivalency is further justification for the elimination of IGCC under step 2 of the BACT analysis.

E. Step 4: IGCC is not a Cost-Effective Control Option.

In the fourth step of the BACT analysis, DHEC may affirm or reject available control technologies based on energy, environmental and economic impacts of that technology. One relevant factor strongly weighing in favor of rejecting IGCC – to the extent that it was ever determined to be the top alternative technology available – is the relatively high cost of building an IGCC generating facility. As indicated in the PSD permit application for the Pee Dee project,[85] the technical literature generally indicates that capital costs of an IGCC unit can be as much as 25% higher than a comparable new pulverized coal generating unit. These disproportionately higher costs for deploying IGCC technology provide grounds for DHEC to reject IGCC as a viable alternative technology under the fourth step of the BACT analysis.

Since submission of the Pee Dee permit application, Santee Cooper has performed its own cost analysis that compares the cost of the SCPC and IGCC technologies for generating units with comparable MW capacity comparable to the proposed Pee Dee units. A copy of this technology analysis is attached hereto for DHEC's consideration. The attached analysis examines both the relative capital cost and levelized cost of electricity from coal units using these two technologies, the approximate cost-effectiveness of SO_2 and NO_x control from SCPC units, and the marginal cost-effectiveness of controlling these pollutants using IGCC instead of SCPC. The results of the analysis further support a decision to eliminate IGCC as not being a cost-effective technology.

Notably, the cost of power from IGCC is estimated under the attached analysis to be about 15% more than SCPC systems. Assuming a net capacity of 600 MW for each of the proposed new units, a 15% increase in costs results in an additional annualized cost of $24 million for the IGCC design versus the SCPC design. The difference in emissions between the amalgam of proposed IGCC plants (adjusted to match the capacity of Pee Dee) and the Pee Dee SCPC unit was 1444 tons per year for SO_2 and 290 tons per year for NO_x. Dividing the incremental power plant cost by the sum of these two emission differences resulted in a marginal cost-effectiveness of $13,000 per ton of pollutant reduction.[86]

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[85] *See* Volume I of the Pee Dee Permit Application at 5-6.

[86] This "cost per ton" estimate is well above what permitting authorities typically deem acceptable. Of note, only air quality management districts in California have developed guidelines for higher cost levels in the case of setting BACT levels for proposed or modified sources located in nonattainment areas. Although referred to as BACT, these limits appear to correspond to the more stringent performance standards for "lowest achievable emission rate" (LAER) that apply to sources subject to nonattainment NSR requirements – which is not the case for the proposed Pee Dee facility.

If the higher cost of IGCC systems is interpreted as a cost of control for SO_2 and NO_x, then this marginal cost effectiveness of control is substantially higher than costs typical for SO_2 and NO_x control at coal-fired power plants, an order of magnitude above the cost estimated above for the proposed Pee Dee unit, and an order of magnitude above the market price for SO_2 and NO_x allowances. This significantly higher cost of control is a legitimate basis for not selecting the more expensive of two highly effective emission control approaches under the top-down BACT analysis. [87]

Finally, DHEC should not forget that federal and state subsidies are still being provided for the deployment of IGCC technology given electric utilities are still unable to bear the entire costs of constructing and operating new IGCC plants. Notably, the Energy Policy Act of 2005 provides for research and development (R&D) on IGCC and gasification technologies through DOE's Clean Coal Power Initiative, as well as tax incentives and loan guarantees to promote further demonstration of IGCC and gasification technologies. The purpose of this legislation is to provide the additional R&D funding and other federal subsidies that are necessary for IGCC and gasification technologies to succeed at large, commercial scale. The existence of these and other governmental subsidies further highlights the indisputable reality that IGCC is not yet a cost-effective option for generating electricity.

F. SELC Overstates the Environmental Advantages of IGCC under Step 4 of the Top-Down BACT Analysis.

The SELC is inaccurate in its claims regarding the efficiencies and benefits of IGCC. SELC states that an IGCC plant is 10 to 20% more efficient in terms of heat rate than a PC unit.[88] While this may be true for a sub-critical PC unit, it is not true for a supercritical PC unit (the type of unit Santee Cooper has proposed for the Pee Dee site). The Massachusetts Institute of Technology report, *The Future of Coal* (MIT Report), released in March 2007, is the result of multi-year studies on advanced technologies and policies that would enable coal's continued use in a CO_2-constrained world. The MIT Report extensively examined the costs and benefits of competing electricity generation technologies and is the most up-to-date, authoritative source on the topic.

In terms of efficiency and limiting CO_2 emissions, a SCPC unit performs slightly better than an IGCC unit. The unit proposed for the Pee Dee site will produce 12% less CO_2 per unit of electricity than a standard PC unit. As demonstrated in the following table, an analysis of the cost of electricity (COE) only highlights that a SCPC unit is the best choice for the Pee Dee site and electricity consumers in South Carolina. In reference to cost, SELC also states that federal tax credits may be available for IGCC plants.[89] While this may be the case, a state agency like Santee Cooper would not realize any

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[87] Santee Cooper is continuing to examine additional cost data as it becomes available for any proposed IGCC projects and will supplement the record on the costs of building and operating IGCC facilities as appropriate.

[88] SELC Comments at page 23.

[89] SELC Comments at page 26.

benefits from such credits because it is a tax-exempt entity. Such cost offsets are therefore not available for the Pee Dee facility.

Technology	Efficiency	COE (¢/kW_e-hr)
Subcritical pulverized coal	34.3%	4.84
Supercritical pulverized coal	38.5%	4.78
IGCC	38.4%	5.13

(Table A, MIT Report)[90]

SELC Comments also discuss the "untested but promising" approach of CO_2 capture and storage (CCS) as a means to further reduce CO_2 from the Pee Dee plant.[91] While CCS is a promising technology, it is not available for current use except in limited applications where it can be utilized for enhanced recovery from existing oil and gas wells. CCS also would add considerable costs and reduce the efficiency of an IGCC plant; the MIT study states that an IGCC plant's efficiency would drop to 31.2% and the COE would increase to 6.52 ¢/kW_e-hr[92] if CCS were to be used.

Most importantly, CCS is not even an option for a new power plant to be located in South Carolina. The report *Potential Sinks for Geologic Storage of Carbon Dioxide Generated in the Carolinas* states: "Geologic units underlying most of North and South Carolina do not meet minimum suitability criteria necessary for long term storage of CO_2." The report goes on to state that in the Carolinas, potential sources of CO_2 will need to be matched with potential sinks for CO_2. Thus, the CO_2 will have to be transported before being injected into the ground and isolated from the atmosphere and fresh water drinking sources.[93] At present, there is no existing CO_2 transportation system (*i.e.* CO_2 pipeline) and no established (or even well-characterized) geologic CO_2 storage site within or near South Carolina. Even if a geologic CO_2 "sink" would become a reality, the cost to build only the pipeline for a power plant in the Carolinas to the closest potential site would be about $4 billion.[94] Furthermore, the report notes that the cost of CO_2 capture and pressurization will greatly exceed the cost of CO_2 transportation and storage.[95]

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[90] *The Future of Coal*, Massachusetts Institute of Technology, Table 3.1,Table 3.5 (March 2007).
[91] SELC Comments at pages 23, 25-26.
[92] *Id.* at 30.
[93] Potential Sinks for Geologic Storage of Carbon Dioxide Generated in the Carolinas at 1 (Potential Sinks in the Carolinas).
[94] Potential Sinks in the Carolinas at 11.
[95] Potential Sinks in the Carolinas at 1.

Review of IGCC Projects Cited by SELC

CHART 1

IGCC Unit	Cancelled	Federal Subsidy	PUC Disapproval (Actual or Expected)	Preferential Rate Request or State Subsidy	Predominately Non-Coal	Multiple Products, Besides Electricity	Partially Non-Coal	Merchant Plant
Lima Energy, Lima OH								x
Milwaukee County, WI	x		x					x
Cash Creek Generation, Henderson Co, KY								x
Taylorville Energy Center, Christian Co., IN				x		?		x
AEP, Meigs Co, OH				x				
Excelsior Energy (Mesaba), MN		x	x				x	x
AEP/Appalachian Power, Mason Co., WV				x				
Duke Energy/PSI, Edwardsport, IN		x		x				
Orlando Utilities/Southern Co., Orlando, FL		x						
Citgo Petroleum/Lake Charles Cogen, LA					x			x
Energy NW, Longview, WA					x			
SouthWestern Power Group, Bowie Station, AZ								x
NRG Energy, CT	x							x
NRG Energy, DE			x					x
NRG Energy, NY								x
Tondu Corp., Corpus Christi, TX					x			x
Westward Energy, OR						x		x
Tampa Electric (new), Polk Co., FL		x						